

May 5, 2005

Robin D. Wankum, P.E.
US Army Corps of Engineers
CENWK-PM-EP
601 E. 12th Street
Kansas City, MO 64106

Re: Berry's Creek Framework Document

Dear Ms. Wankum:

EPA has reviewed the preliminary draft Framework Document for the Berry's Creek Study Area submitted by Malcolm Pirnie, Inc. (MPI), in December 2004. Please have MPI address the following comments and concerns with the document.

I have tried to leave the comments in the original language whenever possible, so if there are questions about any comment, or in general, please contact me.


General Comments

1. The time frame for completing the study and moving to a Record of Decision is too long. EPA would like to plan for a draft ROD in June 2009 and have it be signed by September 2010.
2. EPA believes that the scope of the sampling program and analyses should be reduced to reduce the overall costs for the study. Suggested base costs for Phase 1, 2 and 3 are \$8.0 million, \$6.5 million and \$1.5 million, respectively.
3. Because this document will be provided to the PRPs for implementation, and because the PRPs may wish to modify the document, the Framework Document needs to, above all, convey the logic for conducting the sampling programs described.

While the logic for the type of sampling is given, the basis for the proposed sample sizes and locations needs more clarity. Additional support for the sample sizes and locations will make it easier to get buy-in from stakeholders. These portions of the *Framework* would be improved with descriptions of the criteria, the types of sample designs considered (e.g., biased, random stratified, etc.), and any statistics that were used for choosing specifically identified locations and sample sizes.

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4. The text of the document should have a subsection discussing the evaluation of Interim Remedial Measures (IRMs) after the Phase 1 data collections.
5. The details of the sampling program, now found in Table 5-1 should be included in the text.
6. The Phase 1 study is currently described as defining the vertical extent of contamination. This description can be misleading. It seems like a more appropriate description of the Phase 1 sampling would be an evaluation of contamination and source areas on a broad scale to allow for more detailed follow-up investigations.
7. The detailed study questions in Table 4-1 need to be reworded into statements that are the Data Quality Objectives and the table title should include the term Data Quality Objectives.
8. The Framework Document would benefit from a review of land uses and projects proposed for the Study Area. For example, the Meadowlands Golf Redevelopment Project is developing a portion of the southern part of the Study Area, radio towers will be relocated within the Study Area, a light-rail bridge is proposed over Berry's Creek, and the Xanadu Project will redevelop much of the area around the Meadowlands Sports Complex. Each of these projects has the ability to further complicate studying the extent, magnitude, and implications of contamination in the Study Area as well as restricting what remedial and restoration actions are ultimately proposed.
9. The modeling discussions should better reflect the state-of-the-science with respect to mercury modeling and reflect the uncertainty on the success of such an effort. What type of "back-up analyses" might be necessary if the modeling effort is not successful?

Specific Comments

10. P. 1-1, section 1.1, 4th line: Revise to read, "...risks associated with current and anticipated future uses."
11. P. 1-1, Section 1.2, first paragraph - Please redraft this paragraph to describe the process that led from the Agreement with Morton, the TAWP to the Framework Document.
12. P. 1-2, Section 1.2, top partial paragraph, second line: Revise to read, "...which will select an appropriate remedial action for the Berry's Creek Study Area."
13. P. 1-2, Section 1.2, top partial paragraph, last sentence: Revise this sentence to read, "It is anticipated that any remedial action selected for the site will focus on the wetlands and waterways in the Berry's Creek Study Area. If the study identifies upland sources of

contamination to Berry's Creek, those areas would be addressed by other state and federal programs, as appropriate."

14. P. 1-2, Section 1.2, first full paragraph, second line: Revise to read, "...has been developed according...."
15. P. 2-1, Section 2.1, first paragraph, fourth sentence to end: Revise to read, "For this Study, river miles (RM) are measured beginning at the mouth of Berry's Creek, at the confluence of the natural course of the creek with the Hackensack River, and continue upstream into West Riser on the west side of Teterboro Airport. The measurement of river miles ends just beyond RM 7, near the intersection of US Highway 40 and Route 17. Berry Creek is located in the Boroughs of Rutherford, East Rutherford, Carlstadt, Wood Ridge, Moonachie and Teterboro."
16. P. 2-2, Section 2.2.1: The reference to the EPA web site is incomplete. Please check and include the complete reference.
17. P 3-2, Section 3.1.1.3 - Were the geologic descriptions given here the result of examining and comparing the geologic studies within the Study area, such as those done at the 11 properties mentioned in Sect. 2.2? Can it be said that the sand layers and varved clay layers that are described here are continuous and of similar thicknesses beneath the whole area?
18. P 3-2, Section 3.1.1.4 - The reference to the ground-water level in Kearny, NJ, which is 20 miles away, is not relevant and should be removed.
19. Page 3-2, Section 3.1.1.4: The last sentence in this sections suggests that groundwater will not be considered as a potable water supply. However, if the State use designation of the aquifer is Class IIA, then this ARAR must be considered. The aquifer must be evaluated as a potable water supply in the baseline human health risk assessment (BHHRA), particularly under future use scenarios. Any discussion of the likelihood of the aquifer being used as a potable water supply would occur in the Feasibility Study.
20. P. 3-3, Section 3.1.1.5 - Please indicate on one of the figures the location of the Oradell Dam, with a reference to the figure in the top paragraph.
21. P. 3-4, Section 3.1.1.6: Fairleigh Dickinson University is listed as being within the study area. Please check on this.
22. Page 3-4, Section 3.1.1.6: Please include the distance to the nearest residential homes. The text states that 10 schools are located within the study area, which suggests a particular age group for the recreational/trespassing populations. However, the proximity of homes is also necessary to help identify other age groups that are reasonably

anticipated to access the Berry's Creek study area during recreational activities.

23. P. 3-4, Section 3.1.1.7, 1st paragraph, last sentence: Please delete "Nevertheless."
24. p. 3-4, Section 3.1.1.7, Environmental Resources and Habitat: The New Jersey Natural Heritage Program and database should be referenced and consulted (see <http://www.state.nj.us/dep/parksandforests/natural/heritage/index.html>).
25. p. 3-4, Section 3.1.1.7: Muskrat should be added to the list of mammals (2nd paragraph) since it is an assessment endpoint [see p. 5-8 (Section 5.1.8)].
26. P 3-5, Section 3.1.2, Distribution of Contaminants: The database referred to in the first paragraph should be provided to EPA to share with other agencies and parties conducting the Berry's Creek Study. NOAA maintains a Newark watershed database and is particularly interested in obtaining the database.
27. P. 3-5, Section 3.1.2, third paragraph: Please delete the first two sentences and change the third sentence to read, "The cursory evaluation of historical data for preparation of the Framework Document did not include an evaluation of data quality." Please delete "Finally, " from the last sentence in that paragraph.
28. p 3-5, Sec. 3.1.2, last para: How was non-detect data treated in the cursory evaluation of historical data to estimate nature and extent of contamination? Please briefly describe.
29. p 3-6, Sec. 3.1.2.1, para beneath the bullets: It would be a good idea to state what is meant by an exceedance of an ER-L or ER-M. Make it clear that these are ecological screening values.
30. P 3-6, Section 3.1.2.1, Sediment Contamination: The second paragraph in this section refers to the Effects Range Low and Effects Range Median sediment guidelines. These values are appropriate for marine and estuarine sediments. The Ontario Ministry of the Environment guidelines (Lowest Effect Level and Severe Effect Levels; also listed in the NJDEP sediment guidance document) should be considered for freshwater portions of the site.
31. P. 3-6, Section 3.1.2.1, first bullet at bottom of page, 2nd sentence: Revise to read "However, all surface sediment...."
32. P. 3-7, Section 3.1.2.1,
 - a. First bullet, last sentence: How are the depths "limited"? Are you trying to say that we do not necessarily know the vertical extent of contamination?
 - b. Third bullet: Absolute values are needed to determine whether there is any

significance to the relative concentrations.

- c. Fourth bullet: Absolute values are needed to determine whether there is any significance to the relative concentrations.
 - d. Fifth bullet: Non-detects are a good thing. Please rephrase language.
 - e. First Paragraph, fourth sentence: Shouldn't the cesium-137 peak be at 1963, not 1954?
 - f. First paragraph, eighth sentence: Is there any significance regarding the zinc concentration being greater than the chromium concentration?
 - g. First paragraph, last sentence on page: Goeller seems to make a very strong and significant conclusion from data that "suggest there may be a relationship". Including this seems to give our concurrence with his conclusion. Let's only do so if we really agree with such a conclusion.
33. p 3-8, Sec 3.1.2.3, 1st para: Please include a brief explanation of why the historical data review used data from the sites listed.
 34. P. 3-8, Section 3.1.2.3, first bullet: Insert "mercury" before "concentrations."
 35. p 3-8, Sec 3.1.2.3, soils 2nd bullet: Please check to see if the Ambient Effects Threshold (AET) for arsenic was for sediments. We do not recommend using sediment screening levels to screen soils. The Oak Ridge benchmarks for earthworm toxicity and effects to microbial processes are 60 and 100 mg/kg, respectively. Plant MATCs for arsenic range from 4-105 mg/kg (Jacobs LW, Keeney DR, Walsh LM. Agron J 62, 588-591, 1970; Jiang QQ, Singh BR. Water Air Soil Pollut 74[3/4], 321-343, 1994).
 36. p 3-8, Sec 3.1.2.3, groundwater 1st bullet: Please either identify the AAWQC source directly, or use EPA's 2002 National Recommended Water Quality Criterion for Mercury of a CMC (acute) of 1.4 ug/L in freshwater or 1.8 ug/L in saltwater. These recommended values are protective of aquatic life.
 37. P. 3-9, Section 3.1.2.3, top of page: A note should be made that it is recognized that Acute Ambient Water Quality Criteria are for surface water, but the comparison to this criterion is made based on [I assume] the potential discharge of groundwater to surface water.
 38. p 3-9, Sec 3.1.2.3, 1st complete bullet: The value 69 ug/L is equivalent to the EPA's 2002 National Recommended Water Quality Criterion for Arsenic CMC (acute) in saltwater for the protection of aquatic life.

39. P 3-12, Section 3.3.2.2: Redox is also influenced by plant roots and bioturbation. pH can affect mobility of metals.
40. P 3-12 to 3-13, Section 3.3.2.2. Potential Release Mechanisms. The first paragraph in this section discusses "pathways" rather than release mechanisms. Perhaps this section should be titled "pathways and release mechanisms? In the last paragraph, please insert, "(e.g., mercury methylation processes)" after "sediment".
41. Page 3-13, Section 3.3.3: The *Framework Document* should specify that the product of the risk assessments will be risk-based clean-up levels. For example, in human health, these levels will span the 10^{-4} to 10^{-6} risk range for excess cancer risk. The development of risk-based clean-up levels at the end of the risk characterization will provide the site managers with important information that will be helpful in determining the final clean-up goals for the site. For ecological risks, we encourage the development of clean-up levels for each assessment endpoint. This will provide a range of ecologically protective, risk-based clean-up levels that can be used by the risk managers, in their application of the 9 criteria of the NCP, for the remedial decisions for the site.
42. Page 3-13, Section 3.3.3.1: It may be helpful to include the State Use Designation for Berry's Creek and all of the tributaries to the creek. This information is necessary to identify the appropriate receptors for evaluation in the BHHRA.
43. Page 3-13, Section 3.3.3.1: The issue of subsistence fishing has not been addressed in this section. Is information available to determine whether or not subsistence fishing occurs in the Berry's Creek study area? If not, will this population be considered in the investigation and the BHHRA?
44. p 3-14, Section 3.3.3.2, 1st para: The statement "a possible assessment endpoint is the overall functional health and quality of the Berry's Creek Study Area" will not be useful as an assessment endpoint because it is too broad. However, this statement is a good long-term management goal for the Study Area.
45. p 3-14, Section 3.3.3.2, 1st para: The last sentence beginning with "However, for the purposes..." should be rephrased. Receptors are either at the site, or are potentially at your site, and so you do not choose receptors (you observe them and/or their habitats). It is the potential or candidate assessment endpoints, and later measurement endpoints, that you select.
46. P 3-14, Section 3.3.3.2, Potentially Exposed Ecological Receptors. This section should also discuss the importance of habitat use by the receptors identified (e.g., use by sensitive early life stages of receptors, resident versus migratory species, etc.). This section should also discuss the importance of biomagnification for mercury.

Understanding food web and trophic relationships may help in identification of measurement endpoints.

47. p. 3-14, Section 3.3.3.2, (Potentially Exposed Ecological Receptors): The last bullet notes that some amphibian eggs may be exposed to chemicals in surface water or sediment via absorption. Since amphibians in all life stages have moist, gas-permeable skin, and respire via the skin (especially during hibernation), all life stages are at risk. The statement should be modified.
48. p. 3-15, Section 3.3.4 (Preliminary Chemicals of Potential Concern): Add Jarvinen and Ankley 1999) reference regarding contaminant levels in fish tissue deleterious to fish (see References section below).
49. Page 3-16, Section 3.3.4: Please note that vinyl chloride, which is included in Table 3-8, is identified by EPA as a known human carcinogen, Group A, and therefore should be included along with benzene in the first bullet on this page.
50. p. 3-16 Section 3.3.4 (Preliminary Chemicals of Potential Concern): Total Petroleum Hydrocarbons (TPHC) or an equivalent analysis should be added to the bulleted contaminant list for sediments. NJDEP has often found product associated with levels \geq to 3000 mg/kg. Such levels should be field-tested to determine if free or residual product is present (see N.J.A.C. 7:26E-2.1(a)11). Remediation is required if free and residual product is present (N.J.A.C. 7:26E-2.1(d). Although "product may not be toxic, it degrades soil and sediment media (occludes pore spaces) precludes and greatly diminishes the benthic community.
51. Pp 4-1 to 4-4, Section 4.0: The Rationale for the Study is a good starting point for the *Framework*, but it should be further developed. For example, in the descriptions of the DQO process there is no clear mention of the "identification of the decision", which is step #2 of the process. There is good development of the study questions, but no development of anticipated decision points. Presenting examples of anticipated decision points may be very helpful to the PRPs' understanding of the needs of EPA. There is also a need for improving the correspondence between the Phased objectives described in Sections 4.2-4.4, Table 4-1, and the details of the sampling program which are provided in Table 5-1.
52. Pp. 4-1 to 4-2, Section 4.1, study question: Please revise the questions to read:
 - a. "What are the human health and ecological risks posed by contaminant exposure in the Berry's Creek Study Area?"
 - b. "How long will it take to reach acceptable levels if no action is taken?"
 - c. "What actions can be taken to reduce the time to reach acceptable levels?"
 - d. "To what extent can natural processes expose currently unavailable contamination?"

- e. "To what extent are contaminants transported from the Berry's Creek Study Area to adjacent waterbodies?"
53. Page 4-2, Section 4.1: In the last bullet on this page, the text suggests that portions of the study area will be retained for further analysis if the human hazard quotient exceed 1. However, EPA typically calculates a hazard index and, if the HI value exceeds 1, then proceeds to evaluate target organ specific and, if necessary, chemical specific, HQ values. Please revise the text to more clearly state EPA's evaluation process for noncarcinogenic health effects.
 54. P. 4-3, Section 4.1, second bullet: Revise to read, "...will be identified as chemicals of concern."
 55. P. 4-3, Section 4.1, third bullet: Delete second sentence.
 56. P. 4.3, Section 4.2, first paragraph:
 - a. This paragraph needs redrafting. I think that we want to look at this from the other side. We looked at the historical data to determine what concerns may be present in the Berry's Creek Study Area. We then formulated study questions that we would like to be answered in our investigation, and looked at what type of data would provide the information necessary to answer those questions. Then we compared the data necessary to the existing information to determine the data gaps, and what data collections are appropriate.
 - b. Please delete the third and fourth sentences. If additional evaluation of historic data is necessary prior to Phase 1 sampling, then the Framework Document should directly recommend additional such evaluations, so that EPA can require PRPs conducting the work to do so. More details of what would be evaluated would be necessary to support such a recommendation.
 57. Pp 4-3 to 4-4, Section 4.2, Phase 1 Objectives, and Section 4.3, Phase 2 Objectives: It appears, but is not clearly specified, that the Screening Level Ecological Risk Assessment (SLERA) will be conducted under Phase 1 and that the Baseline Ecological Risk Assessment would be conducted under Phase 2. If this is the case, it should be clarified in the text. Also, it would be helpful to provide information on why a SLERA cannot be conducted using existing information (e.g., data are not available for the entire study area?) rather than wait until the completion of Phase 1 sampling.
 58. P 4-4, Section 4.2: Please include in the description of mass-balance modeling, that the modeling would be conducted for select COPCs (as compared to modeling all COPCs).
 59. P 5-1, Section 5.1: This section discusses surface soil and groundwater sampling, but

there is no plan to conduct any subsurface soil sampling. This is confusing.

60. P 5-1, Section 5.1.1 and Table 5-1: Was there any statistical basis to the sampling designs? For example in the proposed low-resolution core sampling, what is the basis or justification of 15 core transects? Why were 10% and 5% (or 50, whichever is greater) chosen for the Cr/As/Hg speciation and PCB congener analyses, respectively?
61. P 5-1, Section 5.1.1, and Table 5-1: Issues regarding high-resolution cores:
 - a. The reasons for collecting the high-resolution cores are not clear as written in the text or described in the table.
 - b. Please explain why we want to characterize the "historical load" or "geochronological history" of COPCs to Berry's Creek? PRPs could argue that the estimates of sedimentation rates and mixing rates can be obtained via other less expensive means that does not involve that analysis of COPCs.
 - c. From the Table 5-1, it appears that with a minimum of 9 high-res cores, the apparent intent is to capture high-res cores along 5 RMs at 9 specific areas. Collecting only one high-res core in each area (i.e., $n=1$) may not be helpful. If there is an anticipation of using the data to characterize each area, as well as look at the spatial trend by river mile, there will be no accounting for within-area variability. Clarification of intent is needed.
62. p 5-1, Section 5.1.1, Sediment Sampling Plan and Figure 5-1, Phase 1 Sediment Sampling Plan: The basis for the location and spacing of the cores is not discussed in the document.
63. P. 5-1, Section 5.1.1, second paragraph: Revise to read, "...a pre-1950 time horizon. Although actual sedimentation rates are unknown, it is expected that a 6-foot core would capture material deposited for the last century. In addition,..."
64. P 5-1, Section 5.1.1: The assumption that a 6-ft core represents 100 years is based on one core (core # 16 of Goeller 1989). This core had detectable Cs-137 to a depth of 62 cm (2 ft), yielding an average sedimentation rate of 0.75 inch/yr (6 ft = 96 yr). It is rather tenuous to estimate average sedimentation rate from one core. The limits of Cs-137 detection in other Goeller cores were 24 cm, 2 cm, and 17 cm (Appendix C). The first appearance of Cs-137 is generally considered to be 1954, not 1950.
65. P. 5-2, Section 5.1.1, top partial paragraph, last sentence: Revise to read, "...The data will be used, in part, to evaluate..."
66. P 5-2, last paragraph: The horizontal pattern of sediment Hg concentrations along transects may be due, in part, to higher TOC, sulfide, and silt/clay in marsh versus creek bank sediments. Creek banks (i.e., small natural levees) also tend to be relatively well-drained at low tide, and have higher redox potentials).

67. P 5-2, Section 5.1.1, Sediment Sampling Plan, last paragraph: The text needs to better describe how the proposed data collection and attempts to establish residence times will answer the source or sink question.
68. pp. 5-2 and 5-3, Section 5.1.1 (Sediment Sampling Plan): The sample intervals for the low-resolution cores are described; however, the intervals are not discussed for the high-resolution cores. This information should be provided in the narrative.
69. P. 5-3, Section 5.1.1, last sentence: typo - "posses" should be "possess".
70. P 5-3, Section 5.1.1, first paragraph: Reduced sulfur is not as ubiquitous and dominant in fresh water and brackish (Berry's Creek is 4 ppt) sediments as it is in marine sediments. Sea water contains several orders of magnitude more sulfur than fresh water.
71. p. 5-3 (5.1.1 Sediment Sampling Plan), p. 5-8 (5.1.8 Ecological Sampling Plan): It is recommended that for AVS analysis, a thinner (2 cm) surficial layer should be sampled, and a methodology should be used that limits disturbance of the sampled sediments. (Sediments sampled from the 0-6" interval are likely to overestimate AVS available to bind metals due to inclusion of deeper (< 2cm), more anaerobic sediments.) While the specific methodology will be discussed in Work Plan or QAPP, the Framework Document should make it clear that a thin (~2cm) layer should be sampled by a method that limits the disturbance of the sampled sediments.

Please note, that for answering study questions, that BTAG/NJDEP puts little confidence in the ability of AVS/SEM to assess metal bioavailability in dynamic systems. An excess of AVS can bind metals in anaerobic conditions, however, in this dynamic tidal system that is also prone to flood dynamics, scouring with concurrent sediment aeration can release slugs of soluble metals. In addition, the primary biotic zone is likely the upper 2 centimeters where oxygenation is likely greatest due to water currents and bioturbation (fiddler crab above, etc.). Also, oxidized sediment microzones are created by benthic worms and other arthropods.

In addition to the caveats noted in the document (page 5-3) and the comments raised by the NJDEP (Demarest), it must be considered that the use of AVS/SEM is most beneficial in the interpretation of toxicity testing results and shows no consistent correlation to prediction of toxicity in the environment (Science Advisory Board, EPA-SAB-EPEC-95-020). The AVS/SEM can be of value in decision making as a component of weight-of-evidence decisions, but the BTAG does not usually give this line of evidence much weight.

72. P 5-3, Section 5.1.1, Sediment Sampling Plan: More information should be provided on how depositional areas will be identified.

73. P. 5-3, Section 5.1.1, second paragraph: This paragraph should explain the significance of the deposition post-1950, in contrast to low resolution cores that are trying to obtain material for the last century (i.e., three feet v. six feet).
74. P. 5-4, Section 5.1.2, first full paragraph, third line: Typo "dissolve" should be "dissolved".
75. P 5-4, Section 5.1.2: An in-line filter is expected to be used. Will the filter be changed for each sample or every time the samples are picked up. How will effects of storm events be addressed for interpretation of these 7-day composited samples?
76. P. 5-4, Section 5.1.2, second paragraph, third sentence: Rephrase as "Because of the length of time incorporated into the integrative sample, it is not appropriate to analyze for VOCs and dissolved organic carbon (DOC).
77. P. 5-4, Section 5.1.2, second paragraph, last sentence and third paragraph, second sentence: Use of "suspended" and "resuspended" should be confirmed to ensure that it is saying what you meant. I would have reversed the usage of those terms in the two sentences.
78. P. 5-4, Section 5.1.2: Please clarify the water column sampling program with respect to dissolved and whole water samples. Reviewers had concerns that many dissolved samples will be collected which will not adequately reflect contaminant transport or bioavailability associated with suspended material.
79. P 5-5, Sec 5.1.3: The storm event sampling should be mentioned in the text.
80. P. 5-5, Section 5.1.4: This section should be retitled to reflect that it is a review of surface soil samples from upland areas, and not part of the sampling program.
81. P 5-5, Section 5.1.5: Groundwater sampling program - What is meant by geophysical groundwater data?
82. P 5-5, Section 5.1.5, Groundwater Sampling Program: This section needs to provide the potentially responsible parties with more specific guidance on how to arrive at an "estimate of the groundwater contribution to the COPC mass balance." The historical and existing data should be used to identify data gaps in the framework document. Regional geology and known contaminant source locations should be used to help focus sampling. It is unclear whether the "Trident probes along with direct measurements using seepage meters" will be combined with chemical analyses. More explanation is needed in this section given the potential importance of groundwater sources.

83. P 5-5, Section 5.1.5: A more specific approach can be considered to identify the extent and distribution of groundwater discharge. The temperature distribution in the creek sediment is the easiest parameter to measure that indicates where groundwater is entering the creek. The temperature of the sediments and surface water temperature near any groundwater discharge would significantly deviate from the mean creek water temperature. A temperature profile analysis can easily be conducted in a random grid sampling pattern at a time when there is a greatest difference between the temperature of the groundwater and surface water. Subsequent pore water quality sampling and/or profiles in the delineated groundwater discharge areas could then identify the extent of contamination entering the creek and main tributaries.
84. P. 5-6, Section 5.1.6, second paragraph: Why would gas evasion be considered a potential sink? It might be a source to the atmosphere, or the soils/sediments could be a source, but gas evasion itself would not be a sink.
85. P 5-6, Section 5.1.6 - Atmospheric deposition has been evaluated at several other watersheds (e.g. Long Island Sound). The methods used, and the results of those studies, should be examined for their applicability to this study.
86. P. 5-6, Section 5.1.7, second paragraph, 5th line: Typo "extent" should be "extend".
87. Pp 5-6 to 5-7, Section 5.1.7 and Section. 5.8.1.3: It is not clear which geophysical methods will be used to interpolate the geologic data.
88. P 5-7, Section 5.1.8: "Flora and fauna at the reference site should be comparable to what would be reasonably expected at the Berry's Creek Study Area if anthropogenic stressors were removed." Due to the extensive contamination in the Hackensack Meadowlands and throughout much of the Hudson-Raritan Estuary, the Fish and Wildlife Service recommends the reference site be in a location such as the Mullica River watershed that has not been exposed to extensive anthropogenic stressors.
89. P 5-7, Section 5.1.8, Ecological Sampling Program: The last sentence in the second paragraph ("An attempt will then be made to determine if the absence of a particular species in the Berry's Creek Study Area, which is common to the reference site, is due to stress in the Study Area or to other more global influences.") should be removed. The sentence creates the impression that the main purpose of the ecological risk assessment is to evaluate presence or absence of species.
90. P 5-7, Section 5.1.8, Ecological Sampling Program, third paragraph: The text states that "tissue samples will be analyzed for selected analytes listed in Table 5-2." It is unclear which analytes from this table will be included in the tissue analyses. Several of the analytes listed are not typically included in tissue analyses (e.g., volatile organic compounds).

91. P. 5-7, Section 5.1.8, third paragraph, 7th line: Typo "adequate" should be "adequately".
92. pp. 5-7 to 5-8 (Section 5.1.8 Ecological Sampling Program), p. 3-2 (Section 3.1.1.4 Regional Hydrogeology), p. 5-26 (Section 5.8.1.4 Ecological Sampling Report): Note that it is difficult to sufficiently wash phragmites roots to assure that all adherent contaminant has been removed. Any model should assume that a large portion of contaminant exposure is due to incidental ingestion and adherent sediment in the process of root feeding. The feasibility or methodology for this effort should be given special attention.

Algal mats should be considered for plant tissue assay for Hg (etc.) uptake. Hg uptake was found to be very high in a northern New Jersey lake study (reference upon request). Mats can serve as a food source and a means/pathway for contaminant migration (fate and transport). This pathway may be significant if algal mats are common seasonally. Their presence should be determined during the proposed field surveys.

Given the low salinity of Berry's Creek and especially Upper Berry's Creek due to groundwater discharge, SW contributions and tidal gates, different and/or additional assessment and measurement endpoints (fish, macroinvertebrates) may be warranted. A field survey should determine the most appropriate receptors for modeling and tissue bioassays in freshwater to weakly saline waters of the Creek. Different receptors (in part) may be required for the Upper and Lower Berry's Creek or some other "cutoff" location.

93. P 5-7 to 5-8, Section 5.1.8, Ecological Sampling Program: The species selected for tissue sampling should not be selected based solely on abundance and different habitat preferences. Trophic relationships must also be considered; bioaccumulative contaminants will have to be evaluated in species at higher trophic levels.
94. P. 5-8, Section 5.1.8, top of page, 2nd line: Typo "feed" should be "feeds".
95. P. 5-8, Section 5.1.8, top of page, first full sentence: Please revise to read, "Phragmites accounts for a large portion of the biomass in the...."
96. P. 5-8, Section 5.1.8, first bullet. "Mummichog, an estuarine forage fish, is the most common fish species.....", and typo in second sentence, "Mummichogs are....."
97. P 5-8, Section 5.1.8: This section discusses ecological sampling to be conducted as part of Phase 1. As this samples proposed in this section are the only tissue samples to be collected during Phase 1, it would appear that these data will be used in the BHHRA. However, only mummichogs and fiddler crabs are proposed for sampling. As these are not likely to be the preferred fish and shellfish for human consumption, it is suggested that additional species be collected for the purposes of the human health risk assessment.

98. p 5-9, Section 5.2, Sample analysis and Data Validation: An important topic related to these analyses is the use of the data for the initial screens. It is always a good idea to reach an agreement among the parties on the screening values that will be used in the risk assessments. Having this agreement up front will ensure that appropriate analytical methods can be chosen (and described in the QAPP) that will provide limits of detection that will allow for useful screening of the data (i.e., it is not useful to screen with non-detects when DLs/RLs are higher than the screening concentrations that you are using). We prefer to have analytical limits that are below our selected screening benchmarks.
99. P 5-10, Section 5.2.1: The second bullet on this page indicates that PCB congeners will be collected in a subset of samples. There has been no discussion in the framework regarding the utility of the congener data. What is the purpose of collecting these data? How are these data to be used in the RI and the risk assessment?
100. P. 5-10, Section 5.2.1, second bullet: Please delete the word "individual" before "Aroclors" and "congeners". Last sentence: Sometimes it is helpful to have a sum of Aroclors or congeners reported by the lab. As long as we get the values for each Aroclor or congener, it should not be a problem if the lab reports a total PCB value as well. It is agreed that getting only a total PCB value is not acceptable.
101. P. 5-10, Section 5.2.1, last bullet: Do we want to include cesium in the list, if we know that we want that information?
102. Page 5-11, Section 5.3: The text in this section suggests that distributions of the various data will be reported as either normal or lognormal. However, data may follow a gamma distribution, or may be found to be nonparametric. The text should be revised to reflect any type of distribution.
103. Page 5-12, Section 5.3: The fourth bullet states that data will be presented that exceed sediment ARARs. As no promulgated ARARs are available for sediments, the text should be revised to include TBCs.
104. P. 5-12, Section 5.3, 12th bullet: What is the side-scan sonar contact list?
105. P 5-12, Section 5.4, Modeling: This section should restate that EPA intends to conduct the modeling effort itself. Information should be provided on how EPA will coordinate the data needs for the modeling effort with the data being collected by the potentially responsible parties since there will be overlap in data needs.
106. p 5-12, Sec 5.4, 1st para, last sentence: Change "...assist in measuring..." to "...assist in estimating..."

107. P. 5-12, Section 5.4, second paragraph: Is the use of the term "flood" to describe resuspension events appropriate for a tidal system?
108. P. 5-12, Section 5.4, first bullet: Insert "of concern" after "potential chemicals".
109. P 5-13, 6th bullet: The list of preliminary COPCs is only a subset of the list of COPCs on p. 3-16. Please clarify.
110. P 5-13, Section 5.4: Reference to Figure 5-4 should be to Figure 5-5.
111. P. 5-14, Section 5.4, second bullet, last sentence: Please specify what frequency flood plain is expected to be used.
112. P. 5-14, Section 5.5.1: If we want the PRPs to conduct a preliminary risk evaluation prior to field sampling then this section needs additional work to make it say so, and describe that task.
113. P. 5-15, Section 5.5.2, third sentence: Revise to read, "Potential risk from exposure to soil..."
114. p 5-15, Section 5.5.2, 2nd para, last sentence: It is very unlikely that we will be able to account for possible synergism (or additive and antagonistic toxic effects) as such an endeavor is out of the scope of this risk assessment. We don't know enough about mixtures toxicity to be able to do this at a site as complex as Berry's creek. The sentence should be modified to something along the lines of "...which are designed to measure the effects of multiple stressors, document exposure- and concentration-effects relationships, and reduce uncertainties associated with risk characterization based on chemistry alone."
115. p 5-15, Section 5.5.2.2, 1st para, 1st sentence: Change this sentence to "Similar to the screening-level human health risk assessment, a screening-level ecological risk assessment indicates which chemicals and media may pose potential unacceptable risks."
116. P 5-15, Section 5.5.2, Screening-Level Risk Assessment: The last sentence in the second paragraph of this section discusses surface water and sediment toxicity tests but it is unclear whether these tests are recommended for the SLERA. Toxicity testing is not discussed in Section 5.5.2.2, Ecological Screening-Level Risk Assessment. Normally toxicity testing is conducted as part of the BERA. The framework document should be clear and more specifics about the need for toxicity testing, bioassays, and tissue analyses need to be provided in this document.
117. P 5-16, Section 5.5.3: EPA Region 2 recommends that the Pathways Analysis Report (PAR) contain RAGS Part D tables 1 - 6 and the text which explains this information.

118. P 5-16, Section 5.5.4: Please revise the text in the first bullet to read, "An evaluation of the potential threat to human health under current conditions and in the future in the absence of any remedial action."
119. P 5-17, Section 5.5.4.1: Please clarify why the fish ingestion screening values for Region 3, rather than Region 9, are being used.
120. P 5-17, Section 5.5.4.1: Please revise the last bullet to clarify that the frequency of detection approach will be used for each exposure area, and not for the entire data set.
121. P 5-17, Section 5.5.4.2: Do we need to include data collection needs for establishing risk associated with human consumption of waterfowl?
122. P 5-19, Section 5.5.5, Baseline Ecological Risk Assessment, bullets: Add a 3rd bullet indicating that the BERA will provide ecologically risk-based clean-up levels. Please note that these are the protective levels that can be used in risk management decisions that, through the NCP, will determine the final clean-up goals.
123. P 5-20, Section 5.5.5.1, Refinement of the Problem Formulation: Mercury should be added to the sentence in the middle of the second paragraph in this section that discusses bioconcentration and biomagnification of PCBs and PCDDs.
124. P. 5-21, Section 5.5.5.5, Risk Characterization: We should have risk-based clean-up levels reported at the end of the risk characterization. Please note that these are the protective levels that can be used in risk management decisions that, through the NCP, will determine the final clean-up goals.
125. pp. 5-21, 5 -22 (Section 5.5.5.4 Site Investigation and Analysis Phase), p. 5-26 (Section 5.8.1.4 Ecological Sampling Report): Note that fiddler crab has been noted elsewhere as a receptor to be investigated (p. 5-26, etc.). It shall be clarified if fiddler crab and/or blue crab are being considered for the study.

To the list of birds and mammals to be considered for food chain modeling, screws and woodcock should be modeled based on their potential for exposure due to vermivorous diets.

126. P 5-26, Section 5.8.1.4, Ecological Sampling Report and Table 5-1, Details of Sampling Program (Phase 1, Inventory of Flora and Fauna): "Keystone receptors" are not normally included in an ecological risk assessment. More information should be provided on how these receptors would be identified and what the assessment endpoint associated with them would be.
127. P. 5-28, Section 5.9.2: Section number is missing. Revise text to read, "Regulatory

oversight will ensure that the Study can be used to determine an appropriate course of action for the Berry's Creek Study Area. Such oversight may include, but is not limited to field oversight and review of documents."

128. P 9-1, References: The Fish and Wildlife Service provided the following list of literature cited to support their comments. Certain of these references may assist in responding to comments, and others may provide good information which may warrant inclusion in the existing list of references.

Buchanan, G.A., D.R. Russell, and D.A. Thomas. 2001. Derivation of New Jersey-specific wildlife values as surface water quality criteria for: PCBs, DDT, and mercury. New Jersey Department of Environmental Protection, Trenton, New Jersey.

Dimou, K.N., T.L. Su, G.P. Korfiatis, and R.I. Hires. 2003. The distribution of metals, PCBs and PCDD/Fs in the Hackensack River. Abstracts of the Meadowlands Symposium. October 9-10, New Jersey Meadowlands Commission Environment Center, Lyndhurst, New Jersey. 50 pp.

ENSR, International. 2004. Screening level ecological risk assessment of contamination in wetlands considered for restoration in Hackensack Meadowlands District. Final Report. Prepared for the Hackensack Meadowlands Commission and the Meadowlands Environmental Research Institute, New Jersey. 89 pp. + Appendices.

Fort Monmouth Environmental Testing Laboratory. 2004. Analytical data report for Lyndhurst Riverside Marsh. Prepared for the U.S. Army Corps of Engineers, New York District, New York, New York. 115 pp.

Kiviat, E. and K. MacDonald. 2002. Hackensack Meadowlands, New Jersey, biodiversity: A review and synthesis. Prepared by Hudsonia Ltd., Annandale, New York for the Hackensack Meadowlands Partnership. 97 pp.

Kraus, M.L., A. Benda, P. Lupini, and A. Smith. 1987. Species lists of organisms found in the Hackensack Meadowlands: Vascular plants – mammals. Unpublished reported produced for the Hackensack Meadowlands Development Commission. 39 pp.

Litten, S. 2003. Contaminant Assessment and Reduction Project (CARP): Water. New York State Department of Environmental Conservation, Division of Water, Bureau of Water Assessment and Management, Albany, New York. 158 pp.

Long, E.R., D.A. Wolfe, K.J. Scott, G.B. Thursby, E.A. Stern, C. Peven, and T. Schwartz. 1995a. Magnitude and extent of sediment toxicity in the Hudson-Raritan Estuary. NOAA technical memorandum NOS ORCA 88. National Oceanic and Atmospheric Administration, National status and trends program, Silver Spring, Maryland. 230 pp.

Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995b. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. *Environmental Management* 19(1):81-97.

New Jersey Department of Environmental Protection. 1999. Guidance for sediment quality evaluations. New Jersey Department of Environmental Protection, Site Remediation Program, Trenton, New Jersey. 7 pp.

New Jersey Department of Environmental Protection. 2002a. Integrated water quality monitoring and assessment report [305(b) and 303(d)]. A report on the water quality in New Jersey pursuant to The New Jersey Water Quality Planning Act, and Sections 305(b) and 303(d) of the Federal Clean Water Act. New Jersey Department of Environmental Protection, Water Assessment Team, Trenton, New Jersey. 259 pp. + Appendices.

New Jersey Department of Environmental Protection. 2002b. New Jersey surface water quality standards. N.J.A.C. 7:9B. New Jersey Department of Environmental Protection, Trenton, New Jersey. 128 pp.

Parsons, K.C. 2003. Chemical residues in cormorants from New York Harbor and control location. Report submitted to the New York State Department of Environmental Conservation, Albany, New York by the Manomet Center for Conservation Sciences, Manomet, Massachusetts. 161 pp.

Pecchioli, J.A., G. Buchanan, and R. Miskewitz. 2003. Mercury in the Hackensack River: Initial findings of the New Jersey Toxics Reduction Workplan for NY-NJ Harbor. Abstracts of the Meadowlands Symposium. October 9-10, New Jersey Meadowlands Commission Environment Center, Lyndhurst, New Jersey. 50 pp.

Port Authority of New York and New Jersey. 2002. Unpublished dataset. Port Authority of New York and New Jersey, New York, New York. 45 pp.

TAMS Consultants, Inc. 2001. Secaucus High School wetlands mitigation site. Baseline studies: Sampling and analyses of surface water and sediment. Prepared for Hackensack Meadowlands Development Commission, Lyndhurst, New Jersey. 17 pp.

U.S. Environmental Protection Agency. 1999. National recommended water quality criteria. EPA 822-Z-99-001. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. 26 pp.

Yamashita, N., S. Tanabe, J.P. Ludwig, H. Kurita, M.E. Ludwig, and R. Tatsukawa. 1993. Embryonic abnormalities and organochlorine contamination in double-crested cormorants (*Phalacrocorax auritus*) and Caspian terns (*Hydroprogne caspia*) from the upper Great Lakes in 1988. *Environmental Pollution* 79(2):163-173.

129. p. 9-3, References: The following references should be added:

New Jersey *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E)

Jarvinen, AW and Ankley GT. 1999. *Linkage of effects to tissue residues development of a comprehensive database for aquatic organism exposed to inorganic and organic chemicals*. Pensacola FL: Society of Environmental Toxicology and Chemistry (SETAC). 364 pp.

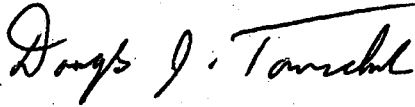
130. Table 3-7: Although degraded by contaminants and other variables, the Meadowlands still harbors a relatively diverse faunal community. Table 3-7 in the Framework Document can be expanded to include a more diverse and representative sample of these species. Investigators have compiled nearly comprehensive lists of the flora and fauna of the Meadowlands. For example, Kraus *et al.* (1987) and Kiviat and MacDonald (2002) both provide extensive species lists (copies of both are available upon request from this office). Species to potentially include in risk assessments in addition to those in Table 3-7 include mink (*Mustela vison*); merlin (*Falco columbarius*), peregrine (*Falco peregrinus*), or kestrel (*Falco sparverius*); plovers (Charadriidae) or sandpipers (Scolopacidae); and *Spartina* sp. Numerous waterfowl species use the Meadowlands for all or part of the year including mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), gadwall (*Anas strepera*), and wood duck (*Aix sponsa*); refer to Kraus *et al.* (1987) and Kiviat and MacDonald (2002) for more complete lists of waterfowl.
131. Table 3-8: Please flag vinyl chloride as a COPC. EPA has classified this chemical as a Group A known human carcinogen.
132. Table 3-8: Please clarify if the Region 9 PRG for residential soils is based on combined pathways.
133. Table 3-9: Ninth row, 2nd column: Typo "phragmites".
134. Table 4-1 Detailed Study Questions:
- a. Page 1 of 6, tasks associated with sub-topic 6: It may be useful to collect information on the groundwater/surface water interaction dynamics using piezometers. However, we could not find this task on Table 5-1.
 - b. Page 2 of 6, sub-topic 9: How important is pursuing atmospheric deposition in Phase 1 or Phase 2? Do we expect to be able to separate out the atmospheric deposition signal from other point and non-point sources?
 - c. Page 2 of 6, tasks associated with sub-topic 12: Why is it important for decisions that we measure the depth of mixing using radionuclide measurements?
 - d. Page 5 of 6, broad topic G and associated subtopics/tasks:
 - i. The inventory to address this study question can be achieved through a

- well-designed and executed biological survey of the site.
 - ii. We suggest that the term "keystone species" be removed from the subtopic 34 and replaced with "functional species" or "functional group". Stick to an assessment endpoint approach (i.e., look to see if any species or groups are missing from a given trophic level in the food chain).
 - e. Page 6 of 6, broad topic H, sub-topic 39: This sub-topic may pose an insurmountable challenge. For example, it is unlikely that we can separate atmospheric mercury from nearby industries from any evaporative or volatilization processes associated with the site.
135. Table 4-1D: Due to the importance of mercury as a contaminant of known concern, should we consider including a subtopic specific to mercury? This would be in addition to No. 22, and would address: 1) the methylation rates of mercury in the Study Area, the factors that influence the methylation rate of mercury, and whether these factors may change in the Study Area due to seasonal changes or gradual changes in the ecology/land uses of the Meadowlands; 2) the fate of mercury recently deposited on the surface compared to older deposits; 3) the potential mobility of buried mercury now and under various potential future conditions/land uses; and 4) the likelihood of any liberated, previously buried, mercury becoming methylated. Please discuss this comment with EPA before incorporating any changes.
136. Table 5-1: Please include in the text why so many forms of chromium, arsenic, and mercury are being analyzed for in the surface water and tissue. For example, why is it important to know concentrations of both methylmercury and dimethylmercury in surface water? Why is it necessary to speciate chromium in tissue? What does this information suggest, and how will it be used?
137. Table 5-1:
- a. There are certain data analyses included in the table that do not require sampling, as would be expected by the title of the Table. Maybe the table should be renamed "Details of Berry's Creek Study?"
 - b. Last line of sediment sampling plan, box for "Field Sampling Requirements": the text for the last bullet is cut off.
 - c. Surface Water Sample Integrated over Tide, Rationale form Program, 6th bullet: This bullet discusses trying to correlate POC and DOC to TSS, but it does not address that we are also trying to measure TSS through a correlation with turbidity as measured by the Optical Backscatter Sensors (OBS). What happens to the program is there is not a strong correlation between the OBS measurements and the TSS samples being used to calibrate the turbidity data set?
 - d. Surface Water Sample Integrated over Tide and Surface Water Sample on Tributaries, Data Analysis, last bullet: Water samples will not be analyzed for VOC and DOC.
 - e. Discrete Surface Water Samples, Data Analysis, last bullet: The last line is cut off.

- f. Review Local Atmospheric Deposition, Field Sampling Requirements: Does this include the work done by Lisa Totten, et al. at Rutgers?
 - g. Side Scan Sonar: If side scan sonar is not successful due to shallow water and narrow channels, then do we want to include a contingency for a sediment probing program?
138. Table 5-2: Can other geotechnical and geochemical parameters be analyzed for soils that should be used in further analysis or modeling? (such as soil pH, soil bulk density, soil moisture content, and some for cation-exchange potential).
139. Table 6-1: Please eliminate the contingency factor.
140. Fig. 1-1: How was the drainage area defined? (cite a reference in the text) Does storm runoff discharge to Berry's Creek from the streets in the urbanized parts of the watershed? Is the drainage area a natural topographic area or is it also based on the street-runoff network? Where does the water from the streets in the drainage basin flow to? Also what is the significance of the line between the upper and lower parts of the drainage area?
141. Figure 3-2, Wetlands in Berry's Creek Study Area: This figure indicates general wetland coverage and type, but the information is old. Updated tidal wetlands coverage has been conducted in this area by NJDEP and is available on NJDEP's GIS. Ben Trotter at NJDEP (609-984-6155) should be contacted for more information and access to this data layer. Information from an updated Figure 3-2 should be incorporated into the text.
142. Figure 3-6: Where does the fiddler crab fit into this diagram?
143. Figure 6-1:
- a. 17 months is too long for writing the Phase 1 Report. Please limit it to 10 months.
 - b. We do not need a peer review of the Phase 1 Report.
 - c. Phase 2 data collections can be moved up a whole year earlier.
 - d. Baseline risk assessments (human health and ecological) should be moved ahead to the end of Phase 1 if possible.
 - e. If treatability studies are left in the schedule, then they should be moved up to start earlier.
 - f. The document text for the schedule should reflect that the work subsequent to Phase 1 are dependent upon the results of earlier work.
144. Appendix D: A web site is not necessary. Please provide additional rationale on why EPA should require PRPs to develop a web site, instead of providing regular updates to the project database.
145. Appendix E, Table E-2: The subtotals for the Ecological Sampling Program - Phase 2 appear to be incorrect.

If you have any questions, please feel free to call me at 212-637-3956.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Doug J. Tomchuk". The signature is written in a cursive, flowing style.

Douglas J. Tomchuk
Remedial Project Manager
Central New Jersey Remediation Section

cc: Scott Thompson, MPI
AmyMarie Accardi-Dey, MPI